

Interactive comment on “TARANIS XGRE and IDEE Detection Capability of Terrestrial Gamma-Ray Flashes and Associated Electron Beams” by David Sarria et al.

Anonymous Referee #2

Received and published: 21 April 2017

This paper presents Monte Carlo calculations of detection rates for Terrestrial Gamma ray Flashes (TGFs) and Terrestrial Electron Beams (TEBs) for a number of current space missions (RHESSI, AGILE and Fermi) and for the upcoming TARANIS mission. The paper demonstrates convincingly that TARANIS can be expected to contribute significantly to the field, especially with respect to the expected number of detected TEBs. The paper, which is well-written is therefore of high interest to the High-Energy Atmospheric Physics community and I can recommend that it for publication in Geoscientific Instrumentation, Methods and Data Systems.

Below I have listed suggested improvements and clarifications

1. The quality of Fig 1 makes it is very difficult to visualize especially the IDEE instru-
C1

ment. The figure ought to be improved. Define also the meaning of a Si cell and a CdTe cell.

2. The XGRE sensors are tilted by 20° to the base plate; but it is not clear how they are placed. Discuss also the expected angular resolution on the TGF direction determination using this arrangement.

3. The XGRE is planned for photons up to 10 MeV, however, the discussion and plots operates with energies up to 20 MeV, for IDEE the discrepancy is even greater since the max energy is 5 MeV. I suggest that at least the plots indicate the energy range of the instruments, e.g. using dashed/dotted lines outside energy range.

4. It is not clear why the total effective area of the IDEE Si detectors is an order of magnitude smaller than their total geometrical area at 610 keV as explained p.8, 11 and shown in Fig 2b. 600 keV electrons will deposit much more than 80 keV in the Si detectors and therefore they will be detected. Comments and clarification are required.

5. It is unfortunate that the authors did not try to estimate the in-flight background. For the Taranis quasi-polar orbit it is expected that the background rates will vary significantly also outside the SAA. Therefore the threshold of counts value n_{min} will vary as well and a single value (e.g. 10 as assumed) might be insufficient. A discussion of the TGF trigger algorithm with respect to a varying background would be useful.

6. For clarity I strongly suggest to include outlines of the continents in Fig. 4. The SAA is here drawn in grey color and appear not dark as claimed in the caption. The same is the case for the Taranis orbit which is grey and not black as indicated in the legend.

I support the line-by-line comments given by Referee #1 with a few additional ones:

1. p. 4, l. 21 we drawn -> we have drawn
2. p.4, l. 27 E_{max} is about 125 keV -> E_{max} (~ 125 keV)
3. p.7, l.14 have a geometrical area of 8 cm^2 (4 per detector) -> have a total geometrical

area of 8 cm² (4 cm² per detector)

Interactive comment on Geosci. Instrum. Method. Data Syst. Discuss., doi:10.5194/gi-2017-1, 2017.